11: India G-4, 5 (1960-1961) 1962 AW11 Kerala AW11

the fishing industry, owns a boat-building yard, a workshop, a cold storage and refrigeration plant and runs a training centre. The fishing villages are thus being developed into what may be called Integrated Fishing Centres.

5.11 *Off-shore Fishing*: An attempt to introduce exploratory and commercial off-shore fishing operations from Cochin port was made by the Travancore-Cochin Government as early as in 1940. A Government sponsored private company operated three large-sized (65 feet to 90 feet) vessels for a time. But these operations proved abortive and were given up owing to lack of trained crew and absence of docking and repairing facilities. Thorough exploratory investigations have been on for the last few years, and at present deep-sea fishing is being carried on jointly by the Government of India and the Indo-Norwegian Project.

5.12 *Chank Fisheries*: With the transfer of some areas of Travancore-Cochin to Madras at the time of the reorganization of States, Kerala has lost some of its important chank fishing centres along the Kanyakumari coast, and only a few centres of lesser importance, Thekkay Kollencode, Poovar, Pulinkudi, Poonthura, Shankumugham and Veri are now left with the State. The right of collection of chanks is annually auctioned on royalty basis, preference being given to cooperatives. The number of chanks collected and the money realized by the cooperatives in 1957-58 and 1958-59 were 26,629 chanks (for Rs. 16,361) and 18,355 chanks (for Rs. 9,177.50) respectively.

Inland Fisheries

5.13 Estuaries, backwaters and adjacent low-lying fields, rivers and canals, ponds, tanks and reservoirs comprise the inland fisheries of Kerala. According to the State Fisheries Department, the total production from these sources is at present about 50,000 tons per annum. This represents only 20 per cent of the total fish production in the State. The inland fish production of Kerala, though much lower than that of West Bengal (12,000 tons), compares favourably with that of Madras (40,000 tons).

Estuaries and Backwater Fisheries

5.14 The more important rivers opening directly into the sea and having permanent link with it are the Periyar, Bharatpuzha, Beypore, Billiapatam and Korapuzha. Regular fishing in the estuaries is done only during the south-west monsoon period (end of May to beginning of August) when fishing activities in the sea, owing to rough weather, are almost at a standstill. The estuarine catches include such varieties as Mullets, Milk Fish, Prawns of different types and Horse Mackerel.

5.15 The backwaters of Kerala covering approximately an area of about 300 square miles, are the most important source of inland fish production. The main areas are Ashtamudy, the Kayamkulam and the Vembanad, all situated in the Southern part of the State. The production from estuaries and backwaters is estimated by the State Fisheries Department at about 46,000 tons per annum. Prawns constitute the bulk of the catch which comprises, in addition to Prawns, Mullets, Bekti, Horse Mackerel and Engraulis.

5.16 Chinese nets and stake-nets are the most important type of tackles used in the backwaters. There are about 1,180 Chinese nets and 5,400 stake-nets operating in the State. These nets are registered on payment of an annual licence fee assessed on them.

5.17 A large area of low lying paddy fields adjacent to the backwaters is used for prawn culture. The whole area is enclosed with earthern embankments (5 to 6 feet high) provided with sluice boxes for regulating the flow of water. Prawn culture in paddy fields is done on an extensive scale in Ernakulam and Trichur districts. Cultivation in these fields is restricted to a single crop lasting from July to September. The fishing operations in these fields extend from October upto the middle of April. Fishing is done with bag nets, scoop nets and drag nets. The fields are grouped into three classes on the basis of productivity. The average yields per square mile per annum from I, II and III Class are estimated at 1,080 lbs., 680 lbs. and 330 lbs. respectively. The area under the three classes are shown in Table 26.

5.18 About 80 per cent of the catches consist of prawns. On a modest estimate, the total production of prawns from these fields would be of the order of 4,000 tons. The rest of the catch consists of Mullets, Pearlspot, etc. Most of the prawns caught from the fields are cured and exported to the other States in India, Burma and Ceylon.

5.19 There are three brackish water fish farms in the State, one each at Mallapuram, Narakal and Ayiramthenga. The individual areas of these farms are 52.5, 42.5 and 22 acres respectively. An additional area of 28 acres is being converted into a farm at Ayiramthenga. Two more farms with a total area of 64 acres are also to be established.

River Fisheries

5.20 The river fisheries in Kerala are very poorly developed. Out of some 44 rivers traversing the State, only four, viz., Bharathapuzha, Periyar, Pamba and Beypore are more than 100 miles long. The more important fresh-water fish belong to the *Barbus* and Cat fish species.

5.21 There is no systematic fishing in the rivers and only a small number of fishermen are dependent on riverine fisheries. Fishing in the rivers is taken up as a hobby by the local people and the catches are utilized for domestic consumption. No data on production and the number of persons engaged are available in regard to river fisheries.

Culture Fisheries

5.22 There are a number of tanks, ponds and reservoirs in Kerala, covering an area of about 6,000 acres. However, the area suitable for fish culture is much less than this. A recent survey of culture fisheries shows that only about 260 acres out of a total area of 1,227 acres surveyed in Trivandrun, Quilon and Alleppey districts are suitable for fish culture.

11: India G-4, 5 (1960-1961) 1962 AW11 Kerala AW11

5.23 One of the reasons for the poor development of culture fisheries is the absence of suitable species of fish in the State. However, organized fish culture in fresh waters has been introduced recently. The varieties of fish stocked are Pearlspot, Tilapia, Mullets, all collected locally and major carps obtained from Madras, Andhra Pradesh and West Bengal.

DEVELOPMENT PROSPECTS OF FISHERIES

5.24 Fisheries hold a prominent place in the economy of Kerala. Their basic importance arises on account of three factors (*i*) in a food deficit State like that of Kerala, the shortfall in the local output of paddy can be counter-balanced to a large extent by increased consumption of fish. Being rich in proteins, they can form a valuable supplement to tapioca which is deficient in protein. In fact, a combination of rice, tapioca and fish can form a well balanced diet; (*ii*) some of the important species found in Kerala, e.g., prawns and shrimps are very good foreign exchange earners; and (*iii*) in addition, fishing is a source of livelihood for a large section of the population. The object of fishery development programmes should be to aim at a progressive increase in the catch of fish with a view to promote its consumption within the State as well as to enhance the foreign exchange earnings through the export of Prawns and the other valuable species.

Marine Fisheries

5.25 Considerable scope exists for the development of marine fisheries in the State. For increasing production from off-shore waters more trawlers and other large vessels will have to be operated. While production from the coastal waters could be raised substantially by operating mechanized boats, more trawlers and other vessels will be necessary for increasing the catch from off-shore waters. Introduction of mechanized boats would call for the provision of adequate docking and navigational facilities.

Off-shore Fisheries

5.26 The potentialities of the off-shore fisheries are yet to be determined. Some of the richest Prawn grounds of the world are located off Kerala coast, and Prawns caught there are of excellent quality. Besides Prawns, fairly large quantities of other valuable species are also caught in the off-shore waters. It may, therefore, be useful to undertake shrimp and purse-sienning. It will also be desirable to operate one or two vessels for Tuna fishing on an experimental basis. Tuna is at present landed in small quantities, but it is believed that there are good prospects of large catches in the off-shore and more distant waters. Since both bull-trawling and other trawling have proved almost equally successful in the Kerala waters, it will be desirable to continue and enlarge these operations further.

5.27 The fishing pressure in the off-shore waters of Kerala is at present negligible. Judging by the intensity of fishing in many other parts of the world, it seems likely

11: India G-4, 5 (1960-1961) 1962 AWll Kerala AWll

that the addition of about 35 trawlers, 50 medium-sized boats and one or two Tuna boats may not have any adverse effect on the resources. However, it is advisable to proceed cautiously in this matter. It is, therefore, suggested that during the next five years only 15 trawlers, 20 medium-sized boats and one Tuna boat be put into operation. If the suggested operations prove successful, the number of off-shore fishing vessels can be increased by another 20 trawlers, 30 medium-sized boats and a few Tuna boats during the Fourth Plan.

5.28 For the present trawlers like Japanese bull-trawlers operating in the off-shore waters of Maharashtra may be employed in Kerala too. The cost of such a trawler with the necessary gear and equipment including navigational and fish finding aids is expected to be Rs. 500,000. The investment in the Third Plan period, for putting into operation 15 such trawlers will be about Rs. 75 lakhs.

5.29 It is expected that the total landing of each of the proposed trawlers will not be less than 700 tons per annum. On account of large proportion of prawns and other quality fishes landed by the off-shore fishing vessels, the value of the catch of a trawler may be estimated at Rs. 210,000 and that of the 15 trawlers about Rs. 30 lakhs.

5.30 For shrimp trawling, purse-seinning and gile netting, medium-sized boats of 50 to 60 feet in overall length, fitted with 80 to 100 H.P. engines may be suitable. A Tuna boat may have to be 120 feet or more in length with a gross tonnage of 250-300. The capital cost of 20 medium-sized boats and a Tuna boat would be about Rs. 45 lakhs. On a rough estimate, the catches would come up to 3,000 tons valued at about Rs. 9 lakhs. The total capital cost for all the vessels would thus be Rs. 1.2 crores, and the anticipated additional annual production by the end of the Third Plan about 12,000 tons valued at Rs. 39 lakhs. The additional investment for the new vessels proposed for the Fourth Plan would come to Rs. 1.75 crores, and the additional production by the end of 1970-71 to about 19,000 tons valued at Rs. 57 lakhs. Thus, the total capital cost of developing the off-shore fisheries during the next decade would be about Rs. 2.95 crores and the total annual additional production would be of the order of 32,000 tons, valued at Rs. 96 lakhs. A total crew of about 850 will be necessary.

5.31 As far as possible commercial off-shore fishing should be undertaken by private companies in collaboration with foreign fishing interests. Such collaboration will not only save the foreign exchange necessary for the purchase of the fishing vessels, gears and other equipment, but it would also provide valuable opportunities for the training of Indian personnel.

Coastal Fisheries

5.32 Introduction of mechanized fishing in the State would substantially increase the output from coastal fisheries. In addition, encouraging results are expected from a more extensive use of improved fishing gear. Mechanization of fishing will require several ancillary facilities like berthing, landing, preservation, marketing, etc. A 22 feet mechanized boat yields about 60 per cent and a 25 feet boat about 110 per cent larger catch as compared with the catch by non-mechanized boats.

11: India G-4, 5 (1960-1961) 1962 AW11 Kerala AW11

5.33 The introduction of about 1,600 mechanized boats during the next decade is not likely to subject Kerala's fishing grounds to undue pressure. A beginning may be made with 600 such boats during the Third Plan. The cost of a new mechanized boat (engine, fishing gear and equipment) would be about Rs. 29,000. It is desirable to continue with the present pattern of financial help to the fishermen for boats and gears in the form of loans and subsidies for some time to come.[1] A subsidized mechanized boat would cost about Rs. 19,000. This amount should be advanced to the fishermen by the Government as a long-term loan. On this basis, the total capital cost of putting 1,600 mechanized boats into operation during the next 10 years will be of the order of Rs. 4.64 crores (Rs. 1.76 crores as subsidy and Rs. 2.88 crores as loan). The consequential annual production is expected to be of the order of 30,000 tons by the end of the Third Plan, and 80,000 tons by the end of the Fourth Plan. The value of the additional production of 80,000 tons will be Rs. 2 crores.

5.34 These mechanized boats should be operated from a select number of Integrated Fisheries Development Centres, each centre being provided with such basic facilities for the fishing industry as the supply of oils and lubricants, refrigeration, processing, etc. The establishment of a number of such Integrated Centres should be the utilimate aim. The Indo-Norwegian Project has already developed an Integrated Centre at Neendakara. About 15 of these centres may be established during the next two Plans. Among other places, Quilon, Alleppey, Cochin, Azhikode, Ponnani, Beypore, Tellichery, Cannanore and Balliapatam would provide good sites for developing such centres.

5.35 The introduction of 1,600 mechanized boats will create employment opportunities directly for about 6,400 fishermen. In order to obviate the unemployment situation, the Government may undertake a programme of supplying about 6,000 indigenous boats which will create employment for about 22,000 fishermen by the end of the Fourth Plan. The average cost of an indigenous boat with the necessary gear would be Rs. 2,000 (Rs. 1,000 for the craft and an equivalent amount for the gear). A subsidy of 25 per cent on the cost of the boat and another 33⅓ per cent on the cost of gear may be given to the fishermen. The total capital cost on 6,000 boats would be about Rs. 1.2 crores. The additional catch from these indigenous boats is expected to be of the order of 60,000 tons per annum by the end of 1970-71, valued at Rs. 1.5 crores.

5.36 The existing boats can increase their catches considerably if they are provided with better fishing gear. At present there are about 22,000 indigenous crafts in the coastal waters of Kerala. Initially, at least a third of these boats should be supplied with better gear. The cost of such a programme would be about Rs. 85 lakhs. At the present rate of subsidy of 33⅓ per cent, the Government's share in this cost will be Rs. 28 lakhs. An additional production of 25,000 tons of fish valued at Rs. 62.5 lakhs may be expected by the end of the Fourth Plan.

5.37 Thus, the development of coastal fisheries would entail a total investment of about Rs. 7 crores, of which Rs. 3 crores would be required during the Third Plan. As a result of this investment, an additional annual production of 80,000 tons valued

[1] A subsidy of 50 per cent is given on the cost of engine, 25 per cent on that of hull, and 33⅓ per cent on that of gear and tackle.

11: India G-4, 5 (1960-1961) 1962 . AWll Kerala AWll

at Rs. 2 crores may be expected by 1965-66 and of 165,000 tons valued at Rs. 4.6 crores by 1970-71.

INLAND FISHERIES

Estuarine and Backwater Fisheries

5.38 The catch of fish from the backwaters could be increased considerably by establishing fish farms on a large scale. Out of the 300 square miles of backwaters, the area that can be profitably converted into fish farms is not known. It is however, believed that it will not be difficult to develop about 15 square miles of this area.

5.39 Areas close to the entrance to the sea can be partly reclaimed by putting up embankments and then converted into fish farms. The fish tanks thus formed can be filled with water from the sea at high tides through channels fitted with sluice and wire gauze shutters. It would be desirable to encourage the private fish farmers and their cooperatives to take up this work on a large scale with the help of Government loans and subsidies. The total initial capital cost for this purpose will be of the order of Rs. 1 crore, of which Rs. 50 lakhs will be required during the Third Plan. The yield per acre of the existing fish farms is about 250 lbs. per annum. But with proper stocking of suitable species, the yield can be raised to 400 lbs. per acre. On this basis, the total output from 15 square miles would be of the order of 1,800 tons valued at Rs. 9 lakhs by the end of the Fourth Plan.

Reservoir Fisheries

5.40 Reservoir fisheries in Kerala also have scope for development. Since the wild stocks comprise mostly cat fish, minor carp and other uneconomic varieties, the reservoirs will have to be stocked intensively with fingerlings of more valuable species. At present there are about 15,000 acres of reservoirs available for fish culture, and an additional area of the same order is likely to become available during the Third Plan. In view of the existing dearth of fish seed, an area of not more than 23.16 square miles may be intensively stocked during the Third Plan. This may be raised to 46.32 square miles by the end of the Fourth Plan. The annual fish seed requirement for stocking 23.16 square miles by the end of the Third Plan will be of the order of 15 millions, increasing to 30 millions by the end of the Fourth Plan. A number of fish seed farms where induced breeding can be undertaken, will have to be established with facilities for rearing the seed into fingerlings. The capital cost of such farms and of five vehicles for transporting the fish seed, etc., would be about Rs. 12 lakhs, half of which could be implemented in the Third Plan. The total annual production of fish from 30,000 acres of reservoirs is expected to be of the order of 2,000 tons, valued at Rs. 9 lakhs.

5.41 Although fish seed production and the stock and management of reservoirs would be the responsibility of the State Fisheries Department, their exploitation should

11: India G-4,5 (1960-1961) 1962 AWll Kerala AWll

be entrusted to Fishermen's Cooperatives. This can be done either on lease or on royalty basis. The Department should, however, provide the necessary technical guidance for exploitation work.

5.42 Effective exploitation of the reservoirs may present some problems on account of the depth of water and presence of obstructions at the bottom. In reservoirs still under construction or planned for the future, all the obstructions like tree stumps, boulders, etc., should be removed before the water is impounded.

GENERAL MEASURES

5.43 An increase in the output of fish or for that matter of any other commodity is not an end in itself. Adequate measures have to be taken to distribute these to the final consumers. A proper distribution system assumes a much greater importance in case of a perishable commodity like fish. The three important aspects of the distribution system viz., refrigeration, transport and marketing are discussed in what follows.

Refrigeration

5.44 The provision of adequate refrigeration facilities is important for the preservation and marketing of fish. The present production of ice in Kerala is about 100 tons. The bulk of this production is consumed in restaurants and other similar establishments ; the quantity available for the fishery industry is far from adequate. The State Fisheries Department has established four ice and cold storage plants, two of them having ice and cold storage equipment only, and the remaining two having freezing facilities as well. In addition to these, the State Fisheries Department has a freezing plant at Vizhinjom. The Indo-Norwegian Project also runs an ice plant, and the ice produced there is utilized for the marketing of fish undertaken by the Project as well as by the fishermen of the Project area. Nearly 814 tons of ice were produced at this plant in 1958-59. Two more ice plants, one each at Chowghat and Azhikode, with a capacity of 5 tons of ice per day and ice and storage capacity of about 40 tons, are expected to be established shortly.

5.45 The existing refrigeration facilities in Kerala will have to be expanded considerably during the Third and Fourth Plans. It will be desirable to set up ice and cold storage plants at all production centres, especially at the proposed Integrated Fisheries Development Centres, where the bulk of the sea fish will be landed. Important consumption centres like Kottayam, Trivandrum, etc., will also require these facilities. It is estimated that about 10 ice and cold storage plants will be required during the Third Plan and another 15 during the Fourth Plan. The total capital expenditure for the installation of these 25 ice and cold storage plants will be of the order of Rs. 75 lakhs of which about Rs. 30 lakhs will be in the Third Plan. It is worthwhile considering the grant of some subsidy to the prospective operators for the installation of such plants. Cooperative societies should also be encouraged to set up and operate these plants.

11: India G-4, 5 (1960-1961) 1962 AWll Kerala AWll

433 442 443 organizational and physical. Most of the fish markets lack such facilities as adequate supply of water, drainage, proper flooring, wire screen, etc. Clean and hygienic conditions for the sale of fish should be created in all the consumption centres. A number of retail and wholesale fish markets should be built at all the major consumption centres. Twenty of these markets may be a good target for the next decade. Provision of fish storage facilities, by way of small refrigerated cabinets is also necessary in retail marketing. The capital cost for building these new markets and providing the storage cabinets would be about Rs. 20 lakhs of which Rs. 8 lakhs may be under the Third Plan. In order to ensure reasonable return to the fishermen it is imperative that cooperative marketing of fish should be expanded as much as possible.

Servicing of Marine Engines

433 504 5.53 The programme envisaged for mechanized fishing will call for adequate servicing and overhauling facilities. The Integrated Fisheries Development Centres, where most of the mechanized boats will be concentrated, should have properly equipped servicing stations. At least three such stations may be established by the end of the Third Plan, and another five by the end of the Fourth Plan. Together, the capital cost of these eight service stations will be about Rs. 4 lakhs.

Cooperatives

226 474 5.54 Fishermen's cooperatives in Kerala are not well developed. Most of the societies are credit societies. Only three cooperative societies are engaged in the manufacture of nets and two in the marketing of fish. Recently some Producer Cooperative Societies have been organized under the auspices of the Fisheries Department. Nets, boats, etc., are owned by these societies and the members carry on fishing on a cooperative basis.

433 226 474 5.55 Simultaneously with the development of fisheries in the next decade, the fisheries cooperative should also be strengthened. The aim should be to bring the majority of the fishermen within the cooperative fold. The Integrated Fisheries Development Centres should all be organized on a cooperative basis, covering all aspects of the industry.

Staff

433 228 647 655 5.56 The Fisheries Directorate appears to be adequately staffed for the work it has to deal with at present. However, the implementation of the expanded programme suggested in this report will not only entail a considerable strengthening of the existing staff, but also require certain new categories of technical personnel. It will be especially necessary to provide an adequate staff to man the mechanized boats and the technical services necessary to operate the boats. A number of training centres should be opened to train the fishermen in the art of mechanized fishing. In addition, each of the Integrated Fisheries Centres should have a trained Marketing Assistant to assist the fishermen and their Cooperatives in organizing the marketing of their catches. It

will be essential to provide a properly trained and experienced Fisheries Development Officer in overall charge of each Integrated Centre for coordinating its activities.

Training

5.57 At present there are three centres to train fishermen in the State. The training course which extends over six months aims mainly at training the fishermen in the operation, servicing and maintenance of marine engines, making of nets and tackles, improved fishing methods and the fundamentals of navigation.

5.58 These centres are located at Neendakara, Ernakulam, and Beypore. The first two centres can train 20 fishermen each in a batch, and the last can train 15. So far, 272 fishermen have been trained at the Ernakulam and Beypore centres (run by the Fisheries Department), of whom 150 are now actually employed in mechanized fishing. At the Neendakara centre, which is run by the Indo-Norwegian Project, 121 fishermen have undergone training so far.

5.59 The programme suggested for the next 10 years would require a crew of about 6,400. This would involve a huge training programme and entail a heavy burden on the State. Arrangements can at best be made to provide training facilities to about half the number. The rest can receive on-the-job training from the trained fishermen. As about 1,200 trained fishermen would be required by the end of the Third Plan, not only will the capacity of the existing training centres have to be increased but also at least five new centres will have to be established.

5.60 The operation of the proposed medium-sized boats will also require the services of trained skipper-cum-master fisherman. Either a special centre for training skippers should be established in the State, or the facilities at the Government of India Deep-Sea Fishing Stations at Bombay and other places should be expanded. For operating trawlers, the State Government should enlist the collaboration of foreign fishing companies in order to obtain along with the fishing vessels, the services of trained technical personnel. At the same time efforts should also be made to train Indian personnel in the various fields by appointing them as understudies to the foreign technicians or by sending them abroad. The training of Fisheries Development Officers, Marketing Officers and other high level technical staff can be arranged at the Institute of Fisheries Education, which is proposed to be started by the Union Ministry of Food and Agriculture. For training the middle and lower level staff, it is desirable to establish a Fisheries Training Institute in the State.

INVESTMENT AND OUTPUT IMPLICATIONS

5.61 A substantial part of investment will be on mechanization of boat craft and acquisition of trawlers for off-shore fishing. These two items alone will absorb Rs. 6.35 crores out of a total investment of Rs. 10.72 crores.[1] Details of investment on various items are given in Table 27.[2] This does not include expenditure on deve-

[1] The outlay allocated for the Third Plan is Rs. 4.5 crores, which will leave a balance of Rs. 6.75 for the Fourth Plan, if suggestions made in this Report are to be implemented.

[2] [Table 27, appearing on p. 289 of the text, has not been processed -- Auditor]

11: India G-4, 5 (1960-1961) 1962 AWII Kerala AWII

*433 654 228 lopment of fishing harbours, landing and berthing facilities, rail transport, training, welfare work, cooperatives, research, etc. A considerable part of the expenditure will be in the form of loan to fishermen recoverable in course of time.

5.62 As a result of this programme the additional production of fish by the end of the Fourth Plan can be expected to be of the order of 200,800 tons per annum, valued at Rs. 5.26 crores. These programmes for fishing development would create additional employment opportunities for about 33,000 persons in Kerala during the next decade. This figure, however, does not include employment opportunities which would be created by the development of culture fisheries, marketing, net-making, transportation, supervision and training.